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Letter to the Editor

Commotio cordis as a result of neutralization shot with the Flash Ball™ less-lethal weapon

Pierre-Marie Brun [a], Jacques Bessereau [b], Hichem Chenaitia [b], Christophe Barberis [c], Michael Peyrol [d,*]

[a] Pre-hospital Emergency Medical Services of Marine Fire Battalion, Marseille, France
[b] Department of Emergency Medicine and Intensive Care, Timone University Hospital, Marseille, France
[c] Department of Emergency Medicine and Intensive Care, Military hospital Laveran, Marseille, France
[d] Department of Cardiology, Centre Hospitalier Universitaire Nord, Marseille, France

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Commotio cordis (CC) is a well-known cause of sudden cardiac death mainly reported in young patients who are accidentally struck in the left precordium. Clinical spectrum of CC is wide but events mainly occurred during sports. We report the first case of a patient who suffered CC related cardiac arrest after being shot with the Flash-Ball™ less-lethal weapon. During an intervention by a police patrol, officers encountered a man described as threatening and aggressive. Neutralization shot was attempted with the Flash-Ball™ handgun to the required distance of 7 m according to the police officer. The man was struck over the left precordium by a rubber bullet, and collapsed to the ground within few seconds. A mobile intensive care unit was dispatched to the scene. Ten minutes after the call, the medical team arrived on field and found a pulse less 43 year-old man with asystole as initial cardiac rhythm. After 12 min of resuscitation, a return of spontaneous circulation occurred. However, the patient was unstable, with mean arterial pressure of 40 mm Hg. At this time, inotropic support was undertaken with adrenaline and dobutamine. Physical examination found a large contusion mark on the left precordium. Cardiac auscultation was normal. Twelve lead ECG showed sinus bradycardia with premature ventricular complex (Fig. 1). Pre-admission transthoracic echocardiography found global severe left ventricular hypokinesia and absence of pericardial or pleural effusion (Fig. 2). The patient was transferred to an intensive care unit. At admission, biological work-up revealed severe lactic acidosis with lactates at 12 mmol/L and absence of troponine-I elevation. Full body CT scan showed a severe cerebral edema and no damage to thoracic structures. In intensive care unit, the patient remained unstable and died the day after due to multiple organ failure. Autopsy was performed thereafter and ruled out any structural cardiac or thoracic injury. Therefore, final retained diagnosis for the presenting scene was sudden cardiac arrest relative to CC. This latter has been reported as a growing etiology of sudden cardiac death representing 3% of overall causes of sudden deaths in young competitive athletes [1]. A precordial chest wall blow in cardiac area occurring during the narrow period of myocardial vulnerability was found to result in immediate induction of ventricular fibrillation [2]. In reported case, unusual documented asystole is not likely to be the initial cardiac rhythm immediately after the impact but certainly results from the prolonged time from event to first documented ECG. Otherwise, another unusual feature in this original case is that CC, mainly reported in healthy athletes who are struck by a small dense projectile in the chest, was here attributed to the Flashball™ less lethal weapon which is designed to incapacitate threatening individuals rather than to cause death. A wide variety of ammunition is available for this device. In present case, blow-producing agent was a soft rubber ball which is 28 g weight and consists of a sponge foam nose with a diameter of 44 mm which is much different in shape from usually reported sporting objects like baseball or hockey puck. The kinetic energy of the rubber ball is indicated to be 200 J at a distance of 7 m and achieves the same effect as an uppercut of a champion boxer. The relatively low risk of this less-lethal weapon has already been questioned [3,4]. Indeed, few publications are available on injuries caused by this device. This case demonstrates that despite the use of the "soft" rubber bullet, the energy delivered by the less-lethal handgun Flash-Ball™ is high enough to induce CC and thus cause death. Although the advantage of temporarily disabling the target makes this kind of weapon attractive for police forces, its potential ability to cause severe or fatal injuries must be considered when defining the rules of engagement of this weapon.

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The authors of this manuscript have certified that they comply with the Principles of Ethical Publishing in the International Journal of Cardiology (Shewan and Coats 2010;144:1–2).

* Corresponding author.
E-mail address: michael.peyrol@ap-hm.fr (M. Peyrol).

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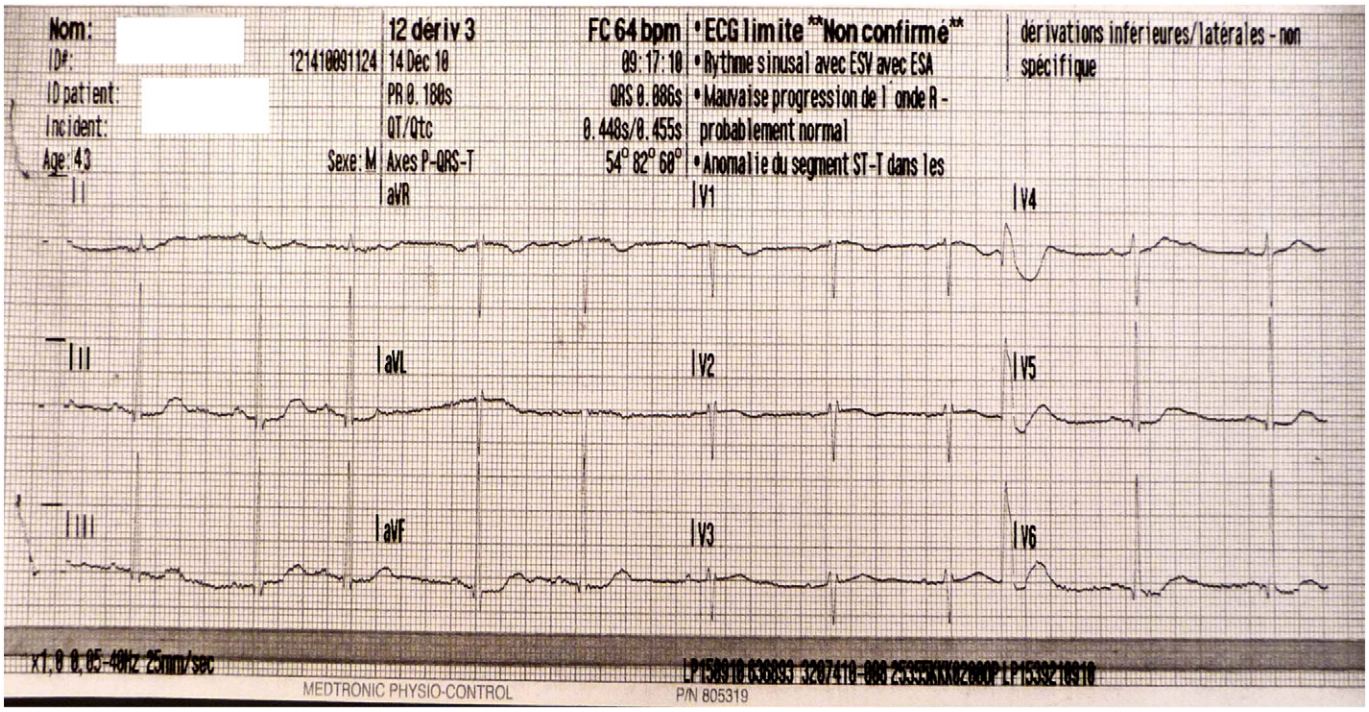

Fig. 1. Twelve leads electrocardiogram tracing registered after cardiac resuscitation showing sinus bradycardia and premature ventricular complex.

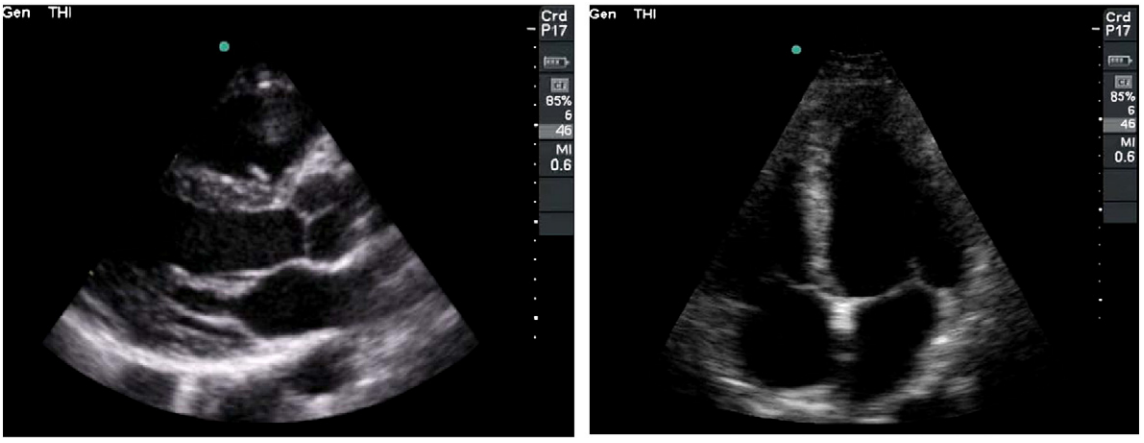

Fig. 2. Bedside trans thoracic echocardiography ruling out any pericardial effusion or structural cardiac abnormality.

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